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CERTIFICATE

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I, David H. Elliott, translator to Messrs. Taylor and Meyer,  
of 29 Kingsmead Road, London SW2 3HY, hereby certify that I am well acquainted  
with the English and German languages and that to the best of my knowledge and  
belief the following is a true translation made by me of the original text of the  
specification of European Patent (UK) No. 0 534 987.

Signed: David H. Elliott

Dated: 28th of October 1994.

## Description

The invention relates to a lining holder according to the generic concept of patent claim 1.

In disk brakes, in particular partial lining disk brakes of known construction which are usable both in passenger vehicles and in utility vehicles, lining holders or supporting plates, insertable into lining shafts and carrying friction linings are used, which are pressed for the purpose of braking a disk brake, by brake application means, against the disk brake. When travelling on uneven ground, very high accelerations, the magnitude of which is estimated at approximately 20 g, arise at the wheel and vehicle axle and therefore at the brake connected rigidly with the vehicle axle. The lining holders are exposed to accelerations of this kind and are inclined to knock with a high force within the lining shafts and their guides, preferably perpendicular to the plane of the ground, so that these forces can act to the full extent on the components of the disk brake.

To avoid the chattering of the linings or the deflection of the guide surfaces in the lining shafts it is known to allow leaf springs to act at the outer edge of the lining holders, which springs clamp the brake lining in its entirety in a springing manner. In order to be able to change a lining quickly with the lowest possible expenditure, a holding bracket carried by the brake caliper housing, e.g. screwable at the latter, is provided which acts on the leaf springs and presses them against the outer edge of the lining holder using pretensioning. Holding brackets of this kind are fixed inter alia with screw connections or with simple pin connections to the brake caliper housing. Pin

connections in this case, have the disadvantage that an explosion-like tension release of the highly pretensioned lining holding spring can result when the pin is knocked out, which at worst can result in injury to persons. In screw connections this problem can in principle be avoided by suitable selection of the thread reach, which provides a contact of the screw in the female thread up to the tension release state, a fixed corroding of the screw due to the operating conditions of the disk brake (heat, cold, dirt, moisture) not however being completely ruled out. The result of this can be that the screw head shears off during the attempt to loosen the screw and therefore the same problem of the explosion-like tension release arises as does with pin connections in the forenamed manner.

Disk brakes for utility vehicles with large-surface dimensioned brake linings have pressure distribution plates for distributing the braking forces, which plates are insertable into shafts of the brake caliper in a way comparable to the lining holder plates and are secured in the same way by means of holding springs against chattering and deflection of the guide walls. With pressure distribution plates of this kind also, which are generally disposed between the mechanical tensioning element and the lining holder plate, problems of the previously named kind can arise when the holding bracket acting both upon the lining holder and the pressure distribution plate is dismantled.

A lining holder according to the preamble of claim 1 is known from EP-A-0 248 385. This known lining holder has at least one lining shaft provided at a brake caliper or a brake housing, into which a lining holder carrying a friction lining, and optionally a pressure distribution plate is insertable, a leaf spring acting upon the outer edges of the lining holder and optionally of the

pressure distribution plate, and supporting a detachable holding bracket at the caliper or housing side. On both sides of the lining holder or pressure distribution plate, a holding clip is furthermore in each case constructed which comprises a semicircular recess into which a corresponding complimentary or semicircular constructed end of the leaf spring engages. By this means an easy insertion of the leaf spring is achieved on the one hand and on the other hand it is ensured that the leaf spring does not readily release during the dismantling.

The stated design of the holding clip does however have the disadvantage that the initially named explosion-like tension release cannot be prevented under all circumstances, inasmuch as even a slight manipulation at the leaf spring leads to the latter temporarily leaving its seat; injuries can therefore likewise not be reliably prevented. A further disadvantage of the known lining holder can be seen in that the design of semicircular ends on the leaf spring is relatively costly.

The object of the invention is therefore to further develop a lining holder according to the preamble of claim 1 such that, in spite of economical manufacture, a sudden distending of the leaf spring during the dismantling can be reliably prevented.

The features according to the characterizing part of claim 1 serve to achieve this object.

The construction of both the lining holder and also of the leaf spring is therefore very simple and still of an absolutely reliable mode of operation, whereby the leaf spring in the tensioned state is guidable with its recesses in such a manner over the holding clips that

the holding clips intersperse its recesses during subsequent complete or partial tension release of the leaf spring and the leaf spring is captively held. During dismantling of the brake lining or of the pressure distribution plate, an explosion-like distending and springing off of the leaf spring does not have to be considered, even when the screw connection which serves to secure the holding bracket shears off, since the leaf spring, after partial tension release, remains hooked and held at the holding clips, gripping the latter from behind.

An advantage of the captive holding of the leaf spring at the lining holder or at the pressure distribution plate also consists in that a pre-assembly of the leaf spring can be carried out e.g. in the workshop, i.e. an insertion of the leaf spring within restricted mounting ratios is no longer required.

Advantageous arrangements and further developments are embodied in further claims:

The invention is explained in the following with respect to the attached drawing, with reference to an embodiment.

Fig. 1 is a partial side view of a lining holder plate with holding clips constructed thereon in which (shown with unbroken lines) the leaf spring is shown located in the hung position, whilst the shape of the leaf spring in the loosened tension release state is shown with broken lines;

Fig. 2 is a plan view onto the leaf spring in its assembled state at the lining holder;

Fig. 3 is a plan view of the leaf spring shown with broken lines in Fig. 1, in its tension release state;

Fig. 4 is an enlarged partial view of one of the holding clips showing the constructed undercut.

Fig. 1 of the drawing shows the generally upper end of a lining holder 1 in the assembled position in simplified partial side view which e.g. is constructed as a holding plate and is insertable with the friction lining (not shown) secured thereon into the lining shaft of a disk brake. Eyelets 3 can be provided in this case on the lining holder, by means of which the lining holder is removable from the lining shaft. Within the lining shaft the friction lining (not shown) lies in a manner known per se opposite a disk brake (not shown), braking elements acting in a likewise known manner, in order to press the friction linings preferably at both sides of the disk brake against the latter.

The lining holders or pressure distribution plates are held in each case, after the insertion into their lining shaft, with the help of a leaf spring 5 which in turn is secured by a holding bracket which extends in a transverse direction to the longitudinal axis of the leaf spring and acts on the leaf spring from the upper side. The holding bracket 7 shown in Fig. 1 in an end face view and in Fig. 2 in partial plan view, can be hung with one end at an abutment or the like holding element (not shown) of the brake caliper housing and is clampable at the opposite end preferably with a screw, relative to the brake caliper housing such that, with the help of the holding bracket 7, a force directed downwards as per the illustration in Fig. 1, is exerted onto the leaf spring 5 and therefore onto the lining holder 1. In the embodiment shown in the drawing, the leaf spring 5 is provided with a lateral projection 9

against which the holding bracket comes to rest; the leaf spring 5, in cooperation with the holding bracket, i.e. in the central region, can also be constructed in other ways in order to take up the tension force of the holding bracket.

The leaf spring 5 is in turn clamped by the holding bracket 7 against spring force for the purpose of spring clamping the lining holder 1, which is why the leaf spring 5 in the assembled state has a more flattened configuration compared with the tension release state, as can be seen from Fig. 1. In Fig. 1 the tension release state of the leaf spring, i.e. the state before the assembly of the leaf spring at the lining holder, is shown with broken lines, whilst the assembled state of the leaf spring 5, being clamped by the holding bracket 7 at the upper side of the lining holder 1, is shown with unbroken lines. In the assembled state a free space 13 exists between the under side of the leaf spring 5 and the outer edge 11 of the lining holder 1, which free space permits the spring movements of the lining holder relative to the leaf spring.

Between the clips 17 of the lining holder 1 which contain the eyelets 3, and the central axis of the lining holder, holding clips 19, into which the two ends of the leaf spring can be hung, extend from the outer edge 11 of the lining holder. The leaf spring has recesses 21 for this purpose, through which the holding clips 19 can be guided in the tensioned state of the leaf spring. The distance of the holding clips 19 to both sides of the central axis and also the distance of the recesses 21 to both sides of the central part 15 of the leaf spring is selected such that the lateral limbs 23 of the leaf spring 5 can only be guided over the holding clips 19 and hooked from behind, in their tensioned state. The securing of the leaf spring at the

outer edge 11 of the lining holder can take place when the lining holder is loosened from the brake caliper or it is carried out directly after the insertion of the lining holder into the lining shaft. The securing in any case takes place before the subsequent positioning and screwing up tightly of the holding bracket 7 which, after it has been secured, exerts a force directed downwards onto the leaf spring positioned at the lining holder. If the disk brake is exposed to heavy knocking in a moving vehicle, i.e. to very high accelerations then, with the help of the leaf spring 5, outwardly directed movements of the lining holder are counteracted; a chattering of the linings or a deflection of the guide surfaces in the lining shaft is prevented by this.

From Fig. 4 of the drawing it can be seen that the holding clips 19 externally comprise undercuts 25, i.e. in a position towards the eyelets 3. In the assembled state of the leaf spring 5, in which it is already somewhat pretensioned by the holding bracket 7, the two holding clips 19 penetrate the windows or recesses 21 into the two limbs 23 in the manner shown in Fig. 1, i.e. the leaf spring 5 is held captively at the holding clips 19, whereby the two outer edges of the recesses 21 do not contact the holding clips. When a lining holder is changed, the leaf spring 5 can be removed from the holding clips 19, if beforehand the holding bracket 7 is released out of its holding position by loosening its screw connection (not shown) at the brake caliper. During this loosening, i.e. swinging round of the holding bracket 7 or during an unwanted shearing off of the screw connection, an explosion-like separation of the leaf spring from the lining holder cannot occur, as a result of the stipulated holding of the leaf spring 5 at the lining holder 1, since the leaf spring, as explained, is secured at the lining holder and a



releasing is only then possible when the leaf spring 5, by means of suitable tools or in another manner, is pressed, pointing downwards such that the limbs 23 carrying the recesses 21 can be removed from the holding clips as a result of the leaf spring distending.

From the views according to Fig. 4 and also Fig. 1, it can be recognized that the holding clips preferably comprise slanting surfaces 27 in the region of the outer edge; these slanting surfaces facilitate the assembly of the leaf spring since the latter can be pressed over the slanting surfaces in a springing manner in order to take up the position at the lining holder shown with unbroken lines in Fig. 1.

According to Figures 1-3, the leaf spring 5 can be chamfered at its two ends 29 pointing upwards, such that the ends lie at the change-over to the clips 17, as illustrated in Fig. 1. The invention is not however restricted to this kind of an embodiment of the leaf spring, i.e., the principle of holding the leaf spring at the lining holder underlying the invention is also realized with a quite different design of the ends of the leaf spring and also with different shaping of the eyelets provided at the lining holder which are used for removing from the lining shaft.

Leaf springs of the described type consist preferably of spring steel of known composition. The manufacture of leaf springs of this kind is realizable in a very simple manner, i.e. they can be manufactured with the simplest tools. In the same way it is very simple in a production technical respect to provide holding clips 19 of the stipulated construction and mode of operation at the lining holder 1.

## Reference List

- 1 Lining holder
- 3 Eyelet
- 5 Leaf spring
- 7 Holding bracket
- 9 Projection
- 11 Outer edge
- 13 Free space
- 15 Central part
- 17 Clip
- 19 Holding clip
- 21 Recess
- 23 Limb
- 25 Undercut
- 27 Slanting surface
- 29 End

PATENT CLAIMS

1. A lining holder for a disk brake for road vehicles, with lining shafts provided on a brake caliper and/or a brake housing, into which each time a pad holder carrying a friction lining and optionally a pressure distribution plate can be inserted, whereby, on the outer edges of the pad holder and optionally of the pressure distribution plate a leaf spring acts, which is supported on a detachable holding bracket on the caliper and/or housing side and in the assembled state is prevented, by means of two holding clips which project out on both sides of the pad holder and/or of the pressure distribution plate, from self-detaching characterized (a) in that on each lateral leg of the leaf spring (5) a recess (21) is formed and (b) in that the holding clips (19) take the form of holding clips (19) which project out from the outer edge of the pad holder (1) and/or the pressure distribution plate and which comprise on their outer edge a rear cutout, said holding clips, in the assembled state, penetrating the corresponding recess (21) in such a way that the outer edge of this recess (21) rests against the rear cutout.

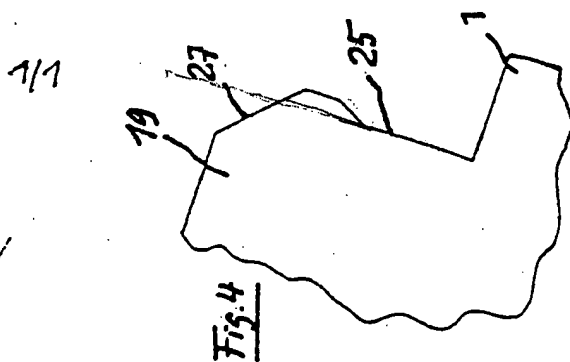
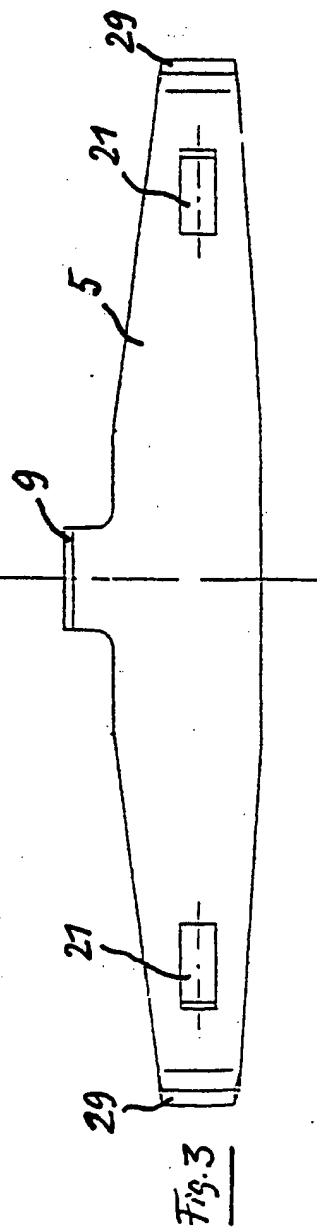
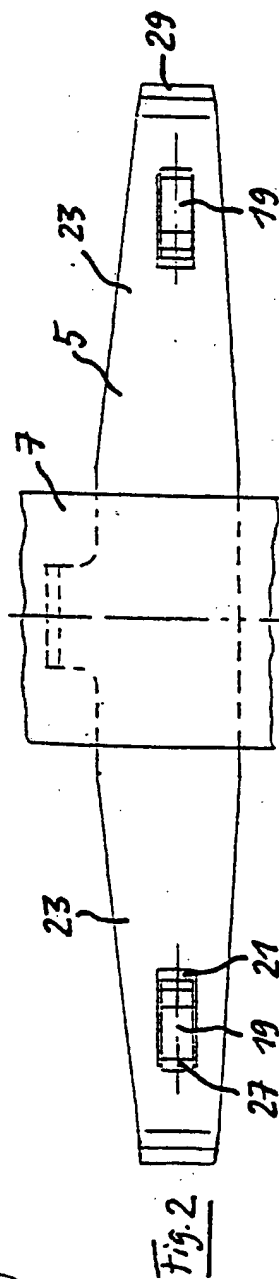
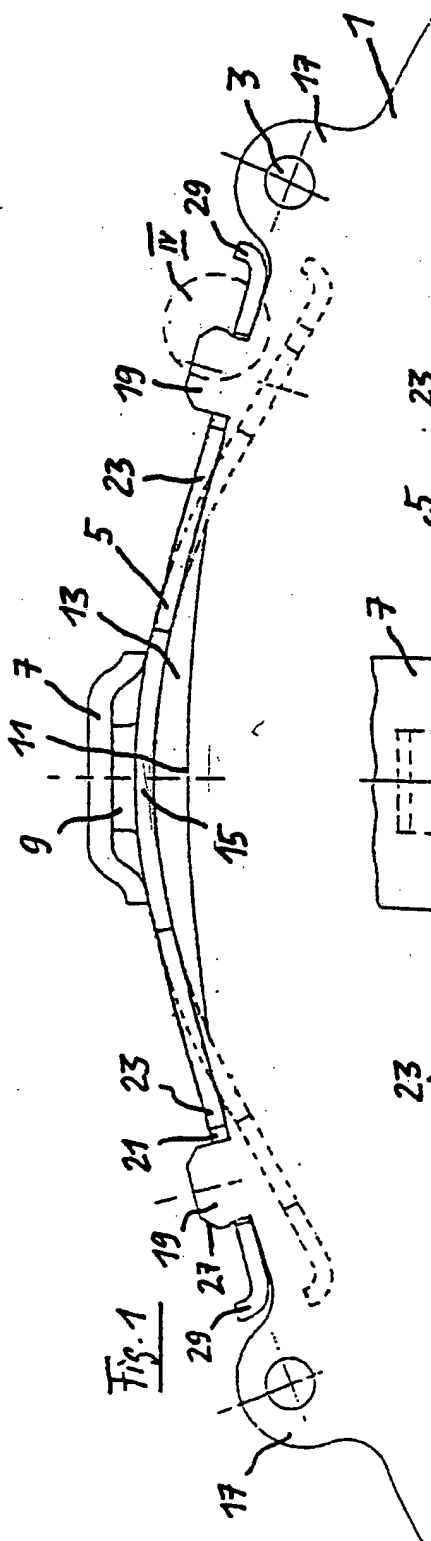
2. A lining holder according to claim 1 characterized in that the leaf spring (5) comprises a camber such that the recesses (21) can be inserted without hindrance over the holding clips (19) during the assembly of the leaf springs (5) owing to their tensioned state.

3. A lining holder according to claims 1 or 2 characterized in that the leaf spring (5) comprises chamfered edges (29), which rest against brackets (17) in the assembled state, and which serve for removing the pad holder (1) and/or the pressure distribution plate.

4. A lining holder according to any one of claims 1 to 3 characterized in that the middle part (15) of the leaf spring (5) in the assembled state opposite the outer edge (11) of the pad holder (1) and/or the pressure distribution plate, comprises a distance such that a sufficient free room is provided for the spring movement of the pad holder (1) and/or the pressure distribution plate relative to the middle part (15) of the leaf spring (5).

5. A lining holder according to any one of claims 1 to 4 characterized in that a piece (9) projecting from the middle part (15) of the leaf spring (5) acts in the assembled state under initial tensioning on the leaf spring (5) by means of the holding bracket (7).

6. A lining according to any of claims 1 to 5 characterized in that a holding bracket (7) which can be screwed or otherwise secured, is provided as a holding bracket (7) on the brake caliper and/or brake housing.



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